

WHAT IS CLAIMED IS:

1. A method of reducing or eliminating neoplastic cells in an *ex vivo* mixture of normal, hematopoietic cells and neoplastic cells by contacting said mixture with a virus.
- 5 2. A method as in claim 1 wherein said virus is an RNA virus.
3. A method as in claim 1 wherein said neoplastic cells are leukemia cells.
4. A method as in claim 1 wherein said hematopoietic cells are marrow cells.
5. A method as in claim 1 wherein said hematopoietic cells are peripheral blood cells.
6. A method as in claim 2 wherein said RNA virus is a single-strand RNA virus.
- 10 7. A method as in claim 6 wherein said single-strand RNA virus is a non-segmented, negative sense RNA virus.
8. A method as in claim 7 wherein said non-segmented, negative sense RNA virus is a rhabdovirus.
9. A method as in claim 8 wherein said rhabdovirus is vesicular stomatitis virus.
- 15 10. A method as in claim 7 wherein said non-segmented, negative sense RNA virus is a paramyxovirus.
11. A method as in claim 10 wherein said paramyxovirus is Newcastle disease virus.
12. A method as in claim 6 wherein said single-strand RNA virus is Sindbis virus.
13. A method as in claim 2 wherein said RNA virus is a double-strand RNA virus.
- 20 14. A method as in claim 13 wherein said double strand RNA virus is a reovirus.
15. A method as in claim 14 wherein said reovirus is reovirus type 3.
16. A method as in claim 13 wherein said reovirus is clonal.

17. A method as in claim 2 wherein said RNA virus is a replication-competent RNA virus.
18. A method as in claim 2 wherein said RNA virus is a replication-incompetent RNA virus.
- 5 19. A method as in claim 1 wherein said neoplastic cells are lymphoma cells.
20. A method as in claim 1 further comprising administering a chemotherapeutic agent before, during or after contacting with said virus.
21. A method as in claim 1 further comprising administering an interferon before, during or after contacting with said virus.
- 10 22. A method of treating cancer in a mammal comprising:
- a) removing bone marrow or peripheral blood cells from said mammal,
  - b) contacting said bone marrow or peripheral blood cells *ex vivo* with an RNA virus,
  - c) performing myeloablative treatment on said mammal, and
  - 15 d) transplanting into said mammal the purged hematopoietic cells of step b.
23. A method as in claim 22 wherein said myeloablative treatment is high dose chemotherapy.
24. A method of treating cancer in a mammal receiving a bone marrow or peripheral blood stem cell transplant comprising contacting the harvested cells of transplant  
20 cells *ex vivo* with a virus, and administering the purged cells to said mammal.